Building the New Reclaimed Water WAC
Proposed Draft Rule Language - work in progress (WIP)
For Rule Advisory Committee Use Only
Wednesday, June 24, 2009

Part IV ADEQUATE AND RELIABLE TREATMENT - version 1.2

(6-17-2009)

Intent of Part IV

1. ***Define:***
   - *Components required to achieve 'adequate and reliable treatment' (ART).*
   - *Process to achieve equivalency by other methods.*
   - *Classes of reclaimed water (two classes- A and B - proposed)*

2. ***Specify:***
   - *Minimum requirements to control the entry of industrial discharges and other toxics that may effect reclaimed water quality.*
   - *Minimum standards to qualify as a Class A reclaimed water including virus reduction standards.*
   - *Minimum standards to qualify as a Class B reclaimed water.*
   - *Minimum standards for adequate and reliable disinfection.*
   - *Minimum standards for treatment reliability.*
   - *Minimum standards for operational reliability.*
   - *Minimum standards for sampling and analysis.*

3. ***Reference additional requirements:***
   - *Minimum requirements by use in Part VI of this rule.*
   - *Detailed criteria in guidance.*

Proposed Sections

173-219-(300-370 introduced to RAC 4-29-2009; RAC review and comment on 6-3-2009)

300-Requirements for Adequate and Reliable Treatment
310-Source Control and Pretreatment Requirements
320-Class A Reclaimed Water Treatment and Monitoring
325-Class B Reclaimed Water Treatment and Monitoring
330-Use-based Treatment Requirements

340-Treatment Process Disinfection
350-Treatment Facility Reliability
360-Operational Reliability
370-Sampling and Analysis Reliability

Proposed Content

WAC 173-219-300 Requirements for adequate and reliable treatment

1. Minimum requirements. Prior to distribution or use, reclaimed water permitted under this chapter must meet the applicable requirements for adequate and reliable treatment including:
   a. WAC 173-219-310 Source control and pretreatment requirements
   b. WAC 173-219-320 Class A reclaimed water treatment and monitoring
   c. WAC 173-219-325 Class B reclaimed water treatment and monitoring
   d. WAC 173-219-330 Use-based treatment requirements
   e. WAC 173-219-340 Treatment process disinfection
   f. WAC 173-219- 350 Treatment facility reliability
   g. WAC 173-219-360 Operational reliability
   h. WAC 173-219-370 Sampling and analysis reliability
2. Alternative Methods.
   a. Other methods of treatment may be accepted if the applicant demonstrates to the satisfaction of the lead agency that the methods of source control, pretreatment, treatment, sampling and monitoring ensure an equal degree of treatment, public health protection and reliability.
   b. For uses requiring Class A and/or additional treatment methods necessary to meet specific use water quality, the lead agency may require pilot plant or other studies to demonstrate that the alternative method is capable of producing reclaimed water that is equivalent to adequate and reliable treatment as described in this chapter.

WAC 173-219- 310 Source control and pretreatment requirements.

{Specific intent: Provide pretreatment for reclaimed water consistent with existing state and federal standards by referencing those standards in rule. Since small reclaimed systems may fall below the threshold size in federal rule, the lead agency may require an industrial user survey if deemed necessary.}

To assure adequate and reliable treatment of reclaimed water, the permittee shall control the entry of industrial and toxic discharges that may affect reclaimed water quality. At a minimum:

1. The reclaimed water generator shall insure that all collection systems providing the source of wastewater used to generate the reclaimed water comply with:
    a. The requirements for pretreatment of industrial wastewater under 40 CFR 403 and Sections 307(b) and 308 in the Federal Water Pollution Control Act, and Ch 90.48 RCW, the Washington Water Pollution Control Act.
    b. The discharge restrictions and prohibitions of dangerous waste regulations, chapter 173-303 WAC and WAC 173-216-060.
2. Unless exempted under WAC 173-216-050, all significant industrial users discharging into the reclaimed water generator's wastewater collection system shall (a) have current waste discharge permits issued by Ecology or (b) be included under an Ecology delegated industrial wastewater pre-treatment program.
3. The lead agency may require the reclaimed water generator to submit an industrial user survey to determine the extent of compliance of all industrial users of the reclaimed water generator's wastewater collection system with state and federal pretreatment regulations.

WAC 173-219- 320 Class A reclaimed water treatment and monitoring

{Specific intent: To streamline the rule by eliminating unused classes. Acknowledge membrane treatment methods by describing a separate treatment technique for membranes. The term "challenge study protocol" will be included in definitions. Virus reduction had not been addressed by current monitoring practice. The proposed requirements for Class A water is protective of uses with human exposure and should be easily accomplished by a well designed and operated system.}

Question: Would the RAC prefer a separate class for membrane treatment? Class A+ or a similar designation? (Class A1 and Class A2?)

Reclaimed water must meet the following technology based requirements to be considered Class A, suitable for approved non-potable uses with unrestricted human contact.

1. Meet either of the following treatment technology trains:
    a. For traditional Class A, the minimum treatment techniques of source control, oxidation, coagulation, filtration and disinfection with treatment occurring in the order listed, or
    b. For membrane filtration Class A, the minimum treatment techniques of source control, oxidation, microfiltration or ultrafiltration with membranes, and disinfection.

2. Bypassing of any treatment units is prohibited.
3. Meet the reliability requirements under this chapter at all times.
4. For traditional Class A treatment systems, meet the following:
    a. At the sampling point immediately following the oxidation treatment process and prior to filtration
        i. Five-day Biochemical Oxygen Demand (BOD5): Monthly average shall not exceed 30 mg/L as measured by a 24-hour composite sample collected at least weekly.
        ii. Dissolved oxygen must be present as measured by a grab sample collected at least daily when wastewater characteristics are most demanding on the treatment facilities.
        iii. Total Suspended Solids (TSS): Monthly average shall not exceed 30 mg/L as measured by a 24-hour composite sample collected daily unless Ecology and DOH allow a reduced frequency.
    b. At the sampling point following filtration and prior to final disinfection, the average monthly operating turbidity shall not exceed 2 NTU and turbidity shall not exceed 5 NTU at any time.
5. For membrane filtration Class A systems, at the sampling point following filtration and prior to final disinfection, meet an average monthly operating turbidity that shall not exceed 0.2 NTU and a turbidity that shall not exceed 0.5 NTU at any time.
6. For all Class A systems, at the sampling point following final disinfection of the reclaimed water, the 7-day median shall not exceed 2.2 total coliform/100mL and sample maximum shall not exceed 23 total coliform/100mL as measured by a grab sample collected daily at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures.
7. For all Class A systems,
    a. At the sampling point following final disinfection of the reclaimed water, meet at least one of the following:
        i. 5-log virus removal or inactivation following nondisinfected secondary wastewater treatment, with a minimum of two treatment barriers, one of which must be filtration or the equivalent.
        ii. 4-log virus removal or inactivation following coagulation, flocculation, sedimentation, and filtration,
        iii. 4-log virus removal or inactivation following micro or ultra membrane filtration
    b. Proof of meeting one of the virus reduction options in subsection (a) above, must be based on either of the following:

i. A challenge study protocol conducted for the proposed treatment system according to State of Washington ***Design Criteria for Reclaimed Water Systems*** and approved by the lead agency.

ii. Acceptance of an equivalent third party challenge study meeting the criteria found in **The State of California Department of Health Services Treatment Technology Report for Recycled Water,** http://www.dhs.ca.gov/ps/ddwem/publications/waterrecycling/treatmenttechnology.pdf. [1]

WAC 173-219- 325 Class B reclaimed water treatment and monitoring
Reclaimed water must meet the following technology based requirements to be considered Class B and suitable for approved non-potable uses with restricted human contact.

1. Meet the minimum treatment techniques of source control, oxidation and disinfection with treatment occurring in the order listed.
2. Bypassing of any treatment units is prohibited.
3. Meet reliability requirements under this chapter at all times.
4. Meet the following water quality requirements at the sampling point for the final disinfected reclaimed water.
   a. Five-day Biochemical Oxygen Demand (BOD5): Monthly average not exceeding 30 mg/L as measured by a 24-hour composite sample collected at least weekly.
   b. Dissolved oxygen must be present as measured by a grab sample collected at least daily when wastewater characteristics are most demanding on the treatment facilities.
   c. Total Suspended Solids (TSS): Monthly average not exceeding 30 mg/L as measured by a 24-hour composite sample collected daily unless Ecology and DOH allow a reduced frequency.
   d. Class B bacterial standards: 7-day median of 23 total coliform/100mL and sample maximum of 240 total coliform/100mL as measured by a grab sample collected daily at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures.

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[1] An example of an equivalent challenge study would be one accepted by the State of California regulation Title 22, Chapter 3, Article 1, 60301.230 for tertiary recycled water. The specified log removal or inactivation may be demonstrated by measuring the number of plaque forming units of F-specific bacteriophage MS2, or polio virus in the water. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

WAC 173-219- 330 Use-based treatment requirements

In addition to the class-based requirements, the reclaimed water must also meet the applicable requirements established in these rules for the specific type of use or uses including:

WAC 173-219-500 Reclaimed Water for Commercial and Industrial Uses

WAC 173-219-530 Land Application (Irrigation) Uses

WAC 173-219-560 Impoundments

WAC 173-219-600 Wetlands

WAC 173-219-650 Stream Flow Augmentation

WAC 173-219-700 Groundwater Recharge

WAC 173-219-900 Other Types of Use

WAC 173-219- 340 Treatment Process Disinfection

{Specific intent: Disinfection criteria is being clarified as to monitoring and calculation techniques for compliance. Chlorine, UV, and other alternative methods may be accepted. The terms "C", "CT", and "T_{10}" will be defined in the definition section. Temperature and pH considerations will be factored into CT calculations. The new guidance manual will provide comprehensive guidance for chlorine disinfection practices and detailed processes for UV and alternative disinfectants.}

All reclaimed water systems must implement a disinfection procedure as part of the treatment process to reduce pathogenic organisms. The disinfection process shall consist of either chlorination, ultraviolet light, or any other system of disinfection approved by the lead agency in accordance with ***Design Criteria for Reclaimed Water Systems*.**

1. **Chlorine.**
   a. Where chlorine is used as the disinfectant in the treatment process for Class A and/or additional treatment methods necessary to meet specific use water quality, all of the following shall apply: :
      i. The required CT measured as mg-min per liter at all times must be 30 or greater.
      ii. The residual concentration, "C", shall be measured as a free chlorine residual.
      iii. The minimum contact time, "T_{10}" shall be based on peak hourly flow.
      iv. Temperature and pH affects on CT will be addressed using procedures outlined in ***Design Criteria for Reclaimed Water Systems*.**

b. Where chlorine is used as the disinfectant in the treatment process for Class B reclaimed water, all of the following shall apply:

i. The required CT measured as mg-min per liter must be 20 or greater.

ii. The residual concentration, "C", shall be measured as a free chlorine residual.

iii. The minimum contact time, "T_{10}" shall be based on peak hourly flow

Temperature and pH affects on CT will be addressed using procedures outlined in ***Design Criteria for Reclaimed Water Systems*.**

c. If pipelines or other facilities are used to meet the required chlorine contact time, such facilities are considered to be part of the treatment process and shall be subject to applicable requirements of these regulations and any other reclamation requirements specified by the lead agency.

d. The lead agency may approve an alternative CT measurement such as total chlorine residual and a modal T value if it is demonstrated to the satisfaction of the departments that the alternative disinfection process provides an equivalent degree of human health and environmental protection.

e. The lead agency may require a CT value greater than specified in 1a. and 1b. above to assure adequate pathogen reduction for a specific beneficial use.

2. **Ultraviolet Light Disinfection**

a. Where ultraviolet light is used as the disinfectant in the treatment process: it shall be designed and installed in accordance with Ultraviolet Disinfection, Guidelines for Drinking Water and Water Reuse, Second Edition published by the National Water Research Institute (NWRI) in collaboration with the American Water Works Association Research Foundation, May 2003, as amended.

b. The lead agency may accept equivalent ultraviolet disinfection methods as described in Design Criteria for Reclaimed Water Systems.

3. **Other Disinfection Systems**. Where disinfection systems other than chlorine or ultraviolet light are used in the treatment process, the lead agency shall review and approve the design and installation on a case-by-case basis. Design and operational requirements shall conform to recognized standards and engineering practices as defined in ***Design Criteria for Reclaimed Water Systems.***

WAC 173-219- 350 Treatment Facility Reliability

{Specific intent: Establish general minimum requirement for reliability in the rule, with detailed methods in the guidance document. Retention sizing detail for those facilities without an alternative discharge shall be placed In guidance.}

1. All reclaimed water facilities shall be designed and operated to meet the reliability requirements as follows:
   a. There shall be no bypassing of untreated or partially treated wastewater from the approved reclamation facility to the distribution system or to the point of use.
   b. Facilities generating reclaimed water must either retain inadequately treated wastewater for additional treatment or have authorization to discharge the wastewater to another permitted site. Facilities may provide both options.
   c. Retention. Retention facilities that are approved as treatment reliability features must:
      i. Reserve the approved facilities for the intended purposes.
      ii. Include all the necessary diversion works, conduits, and pumping and pump back equipment.
      iii. Provide a power supply independent of the primary power supply or a standby source for all diversion equipment.
      iv. Provide adequate capacity that may include multiple treatment trains or standby replacement equipment acceptable to the lead agency.
   d. Alternative Discharge Location. Facilities approved to discharge to another location as a treatment reliability feature must:
      i. Obtain all required authorization and permits for the discharge location.
      ii. Include all the necessary diversion works, conduits, and pumping and pump back equipment.
      iii. Provide a power supply independent of the primary power supply or a standby power source for all diversion equipment.
   e. Automated Diversions. Facilities approved to use automated diversions as a treatment reliability feature**,** must provide all necessary sensors, instruments, valves, and other devices to enable fully automatic diversion to the approved location. The reset process must be manually operated to prevent automatic restart.
   f. Alarm System Requirements.
      i. All facilities generating reclaimed water must provide alarm systems warning of a) loss of power from the primary power supply, b), failure of required treatment units, c), interruption of required chemical feeds, and d) other features as required in the approved engineering report.

ii. Alarm systems approved as treatment reliability features must be independent of the primary power supply of the reclamation facility.

iii. Alarm systems approved as treatment reliability features must sound at an attended location to warn the operator in responsible charge or other designated responsible person capable of taking prompt corrective action. Individual alarms may be connected to a master alarm sounding at an attended location. If the facility is not attended at all times, the master alarm must sound at an attended location (such as a police or fire station) that will immediately alert the person in responsible charge be independent of the primary power supply of the reclamation facility.

2. In addition to the reliability requirements listed above, all facilities must be consistent with design and operational criteria specified in ***Design Criteria for Reclaimed Water Systems.***

3. Exceptions to the required reliability features listed above may be approved by the lead agency if the applicant demonstrates the alternative will provide an equal degree of treatment reliability.

WAC 173-219- 360 Operational Reliability

1. Each facility generating reclaimed water must provide:
   (a) Sufficient qualified personnel to operate the facility effectively to achieve the required level of treatment at all times and
   (b) A preventive maintenance program to ensure that all equipment is kept in a reliable operating condition.

2. The facility generating reclaimed water must:
   (a) Maintain operating records at the reclamation plant or at central depository within the operating agency. Records must include: all analyses required by the permit; records of operational problems, unit process and equipment breakdowns, and diversions to emergency storage or disposal; and all corrective or preventive action taken.
   (b) Record process or equipment failures triggering an alarm and keep them as a separate record file. The recorded information must include the time and cause of failure and the corrective action taken.

   (c) Submit a monthly summary of operations on a form provided, or otherwise approved, by the lead agency, postmarked or received by the date specified in the facility operating permit. The contents of this summary shall include all conditions specified in the operating permit.

(d) Immediately report any discharge of untreated or partially treated wastewater to the use area, and the cessation of same, The lead agency may establish additional reporting requirements within the permit.

WAC 173-219- 370 Sampling and Analysis Reliability

{Specific intent: Provide flexibility to monitoring parameters and frequency for well performing and small reclaimed water systems. The lead agency may request additional monitoring for systems with compliance problems.}

1. The lead agency must specify the reclaimed water sampling parameters, locations and frequencies within the permit. The lead agency must consider:
    a. Minimum sampling types and frequencies listed under class-based requirements.
    b. Minimum sampling types and frequencies listed under use-based treatment requirements.
    c. Probability that the parameter will be present in the reclaimed water in a quantity that would adversely impact the quality of the water for the use.
    d. Other site-specific conditions.

2. For some uses, the lead agency may require a ground water, wetland or surface water monitoring program. The monitoring program shall be based on type of use, reclaimed water quality and quantity, site-specific soil and hydrogeologic characteristics, and other considerations.

3. All required samples must be analyzed by approved laboratory methods, and conducted by laboratories meeting the accreditation requirements of chapter 173-50 WAC.

4. A permittee may request the lead agency to consider a reduced monitoring schedule for water quality parameters with the exception of turbidity and total coliform. The lead agency will evaluate the request with consideration for the size of the permitted facility, the cost of monitoring, compliance history, the risk to public health or the environment, and other relevant factors.

5. The lead agency may increase monitoring frequency for cause. The lead agency will evaluate the size of the permitted facility, the cost of monitoring, compliance history, the risk to public health or the environment, and other relevant factors.